



FEATURES

The linear bearings in this catalogue are designed to provide accurate trouble free linear motion. Bearings are available with bore sizes from 3mm up to 25mm. Unique to this range is a special anti-rust coating. In salt spray tests Reliance anti-rust coated bearings have shown superior resistance when compared to standard 440c corrosion resisting steel.

INSTALLATION

Recommended fitting details between the bearings and shafts or housings are shown below.

Recommended Tolerances					
Shaft			Housing		
Shaft Diameter mm	Standard Clearance f6-g6	Tight Clearance h6	Outer Diameter mm	Standard Fit H7	Tight Fit J7
3	-0.010 -0.019	0 -0.009	7	+0.018 0	+0.010 -0.008
4					
5					
6					
8					
10		0 -0.011	12	+0.021 0	+0.012 -0.009
12					
13					
16					
20			-0.010 -0.021		
25	40				

We recommend that under normal conditions the standard clearance dimensions are used, this will give an in service clearance of 0/+0.010mm. The hardened shafting in this catalogue is designed to provide “standard clearance”.

Applications requiring a small degree of preload can be catered for by ensuring that the bearing/shaft clearance is 0/-0.010mm. Interferences greater than 0.010mm can have adverse effects on the bearings operating performance and life.

A simple check is that if the shafting rotates easily in the bearing then the correct fit has been achieved. A small amount of resistance means that there is some preload in the bearing. If the shaft is stiff or unable to rotate the preload is too high and the life of the bearing will be dramatically reduced.

FRICITION

The frictional coefficient of our linear ball bearings is generally in the order of 0.001 to 0.003.

LUBRICATION

Generally bearings with double seals should be used. Double seals ensure that the bearing lubricant is retained and provide some degree of protection against dust and foreign objects.



BASIC LOAD RATING AND LIFE

To give maximum life it is recommended that the load is distributed as evenly as possible over as many ball tracks as possible. For example, a longer life can be achieved by positioning a point load between two ball tracks rather than directly above one.

In application where moment loads exist double bearings should be used.

Moment loads may have an adverse effect on the performance of the bearing and should be avoided. If this is not possible then two separate bearings should be used spaced as far apart as possible, preferably with a small preload.

1. Rated Life

This is defined as the travel distance (50,000 metres) which 90% of a group of balls the same size and type can cover under the same condition, without any signs of flaking caused by rolling contact fatigue.

2. Basic Dynamic Load Rating

This is the load acting on a row of balls which are situated in the line of action, and show no deterioration during their rated life of 50,000 metres.

3. Basic Static Load Rating

This is the load which will cause permanent deformation amounting to one ten thousandth of the rolling elements diameter at the contact surface of the ball under maximum stress.

4. Formula For Rated Life

The rated life is calculated by the following equation. Factors are introduced to take account of the shaft hardness, operating temperatures, impacts, vibrations, and the arrangement of aligned balls.

$$L = \left(\frac{f_H \cdot f_t \cdot f_B \cdot C}{f_s \cdot P} \right)^3 \cdot 50 \quad (\text{km})$$

L = Rated life	km
C = Basic dynamic load rating	kgf
P = Radial load	kgf
f _H = Shaft hardness factor	Fig. 1.
f _t = Temperature factor	Fig. 2.
f _B = Layout factor for ball position	Fig. 3.
f _s = Impact and vibration factor	Fig. 4.

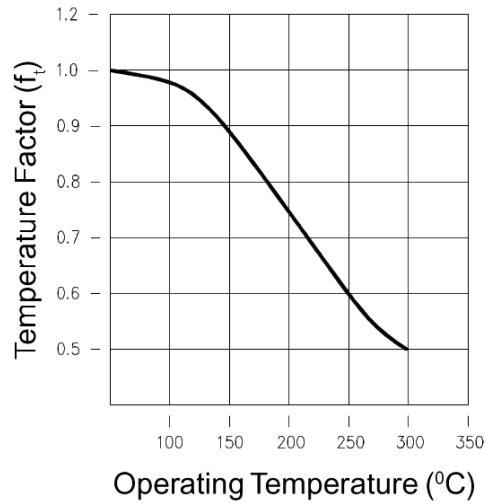
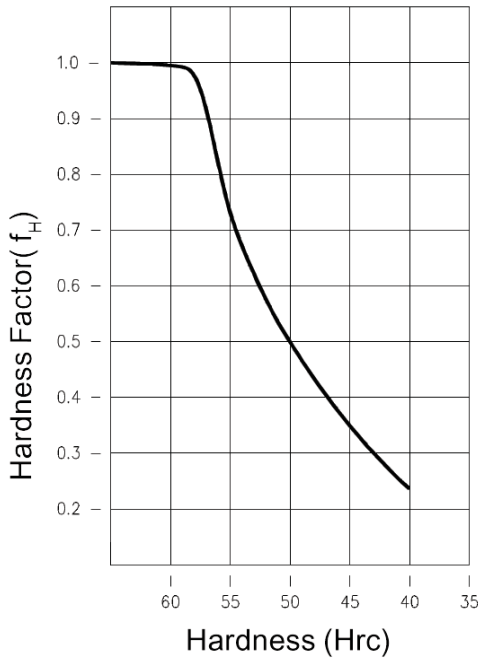
In the case where both the stroke length and frequency are constant, the rated life (L) in kilometers obtained from the above equation can be converted into rated life in hours (L_h) by the following formula.

$$L_h = \left(\frac{L \cdot 10^6}{2 \cdot l_s \cdot n \cdot 60} \right) \quad (\text{hr})$$

L _h = Rated life in hours	hr
l _s = Stroke length	mm
n = Cycles per minute	cpm



5. Life Calculation Factors



Illustrated correction between rows of balls and applied loads	Number of Rows of Balls		
	Four Rows	Five Rows	Six Rows
f _B	1.414	1.463	1.280

Fig 3. Layout Factor (f_B)

Impact and Vibration Factors	
Operating conditions	f _s
No impacts or vibrations exist with reciprocating speed, V = 300mm/sec or less	1 - 1.5
Slight impacts or vibrations exist with reciprocating speed, V = 1000mm/sec or less	1.5 - 2.0
Heavy impacts or vibrations exist with reciprocating speed, V = 1000mm/sec or more	2.0 - 4.0